Chemical bonding of NLO chromophores to the sphere surfaces of a photonic colloidal crystal.

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Among other type of photonic crystal materials, organic based 3-D photonic crystals outstand because of their facility of processing, maneability, easy modulation via synthesis, and low cost (1). As it has been shown in the past, colloidal crystals, a particular kind of those organic photonic crystals can be used to enhance a second order nonlinear interaction (2). However, to enhance such effects it is necessary the surface modification with Non Linear Optical (NLO) chromophores of the polymeric microspheres that conform the colloidal crystal array.

Organic *push-pull* chromophores are good candidates to display large non-linear responses on such photonic crystals. We have synthesized a novel group of *push-pull* molecules derived from acridine and benzothiazole, to be incorporated to macromolecular systems, such as for instance over the surface of polymeric spheres of colloidal crystals. In addition, we have synthesized analogues of well-known highly nonlinear chromophores, like Ethyl Orange or Crystal Violet with a side linkable chain with the same purpose.

Immunology protocols of coating latex microspheres (3), based in the classical solid-phase methods of synthesis, were used to bind such molecules on a carboxylate-modified latex. In such conditions, coverage up to 60 % of the maximum possible was achieved. Measurements of SHG in such conditions resulted in a efficiency almost four orders of magnitude larger with respect to the case where the molecules were simply physically absorbed on the surface of the polymeric spheres of the colloidal crystal.

[1] See, for instance, C. Liguda, *et al. Appl. Phys. Lett.*, **78**, 2434 (2001). D. Pisignano *et al., Nanotechnology,* **15**, 766 (2004).

[2] J. Martorell, R. Vilaseca, and R. Corbalan, *Appl. Phys. Lett.,* **70**, 702 (1997).

[3] Among others, G. Quash *et al., J. Immun. Meth.*, **22**, 165 (1978). O. Siiman, A. Burshteyn, M. E. Insausti, *J. Colloid Interface Sci.*, **234**, 44 (2001).